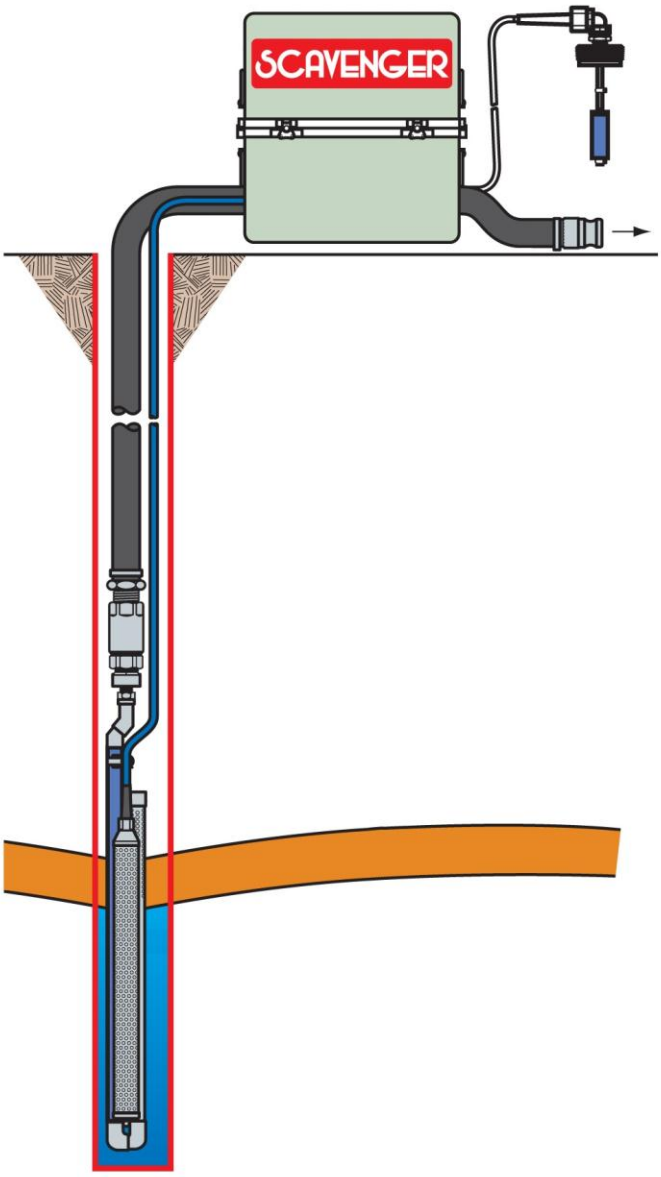
geotech

Shallow Well Probe Scavenger

Installation and Operation Manual



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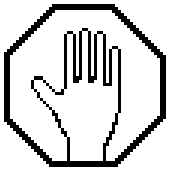
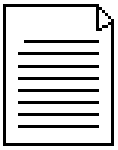
Documentation Conventions

This manual uses the following conventions to present information.

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.



A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.



A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: System Description

Function and Theory

The Geotech Shallow Well Probe Scavenger (SWPS) is an explosion proof (EP) pumping system for removing hazardous hydrocarbons from the surface of water in wells. Used with its product probe, the system pumps only hydrocarbons from wells 2” (5 cm) in diameter or larger.

The system is flexible: The pump intake and probe may be placed at any depth within the suction lift capabilities of the pump, and where there is at least 3 feet (1 m) of product and/or water in the well. All hazardous electrical parts are in explosion proof containers and the probe itself is intrinsically safe.

The system consists of a Pump Control Module (PCM) (Figure 1-1), a product probe (Figure 1-2), a Tankfull probe (Figure 1-3), and an intake assembly (Figure 1-4). The standard unit has 115/230V, single phase, 1/4HP motor with a 4gpm (15 lpm) pump. The suction line is 20’ (6 m) long and the pump will lift 20’ (6 m) if properly primed.

Figure 1-1 – Shallow Well Filter Scavenger Control Module Assembly

The PCM consists of the motor/pump and an EP box, which contains the operational electronics. The product and Tankfull probes connect to the top of the control box.

With the control switch in the AUTO position, the product probe controls the pump. The HAND position overrides the probe and directly powers the pump. A red light indicates float status and Tankfull override conditions.

The standard probe (Figure 1-2) consists of a 1” (2.5 cm) diameter hydrocarbon float and a 1” (2.5 cm) diameter water float. When the hydrocarbon float rises, it activates a time delay which turns on the system (after a user set period of time). This time may be varied by adjusting the potentiometer within the EP box. A preset delay can prevent the pump from turning on and off too frequently. The water float prevents the pump from running when the intake is in water.

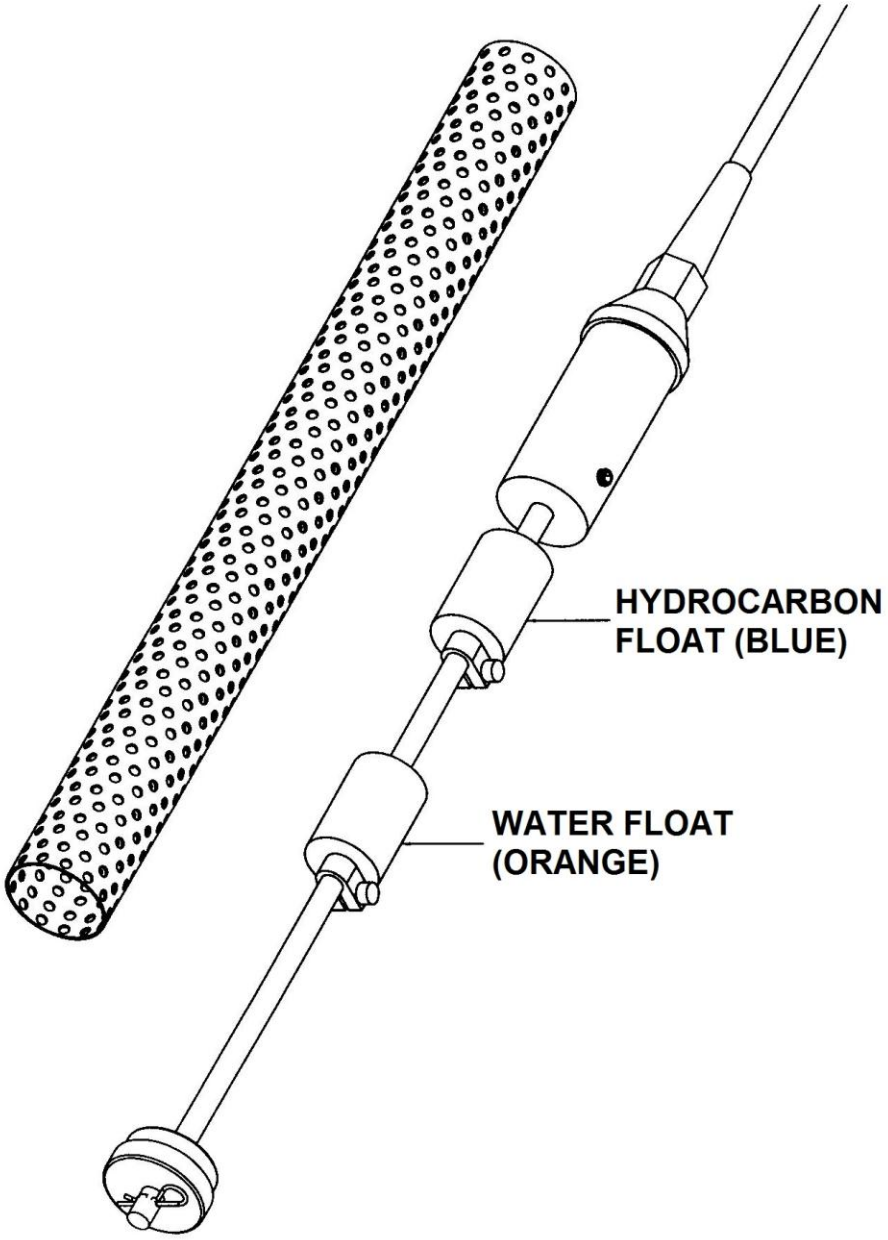


Figure 1-2 – Product Probe Assembly

System Components

The SWPS system consists of two parts, one of which comes packaged in an optional weatherproof NEMA 3 rated case. The case is opened by unsnapping its eight latches and lifting off the top with its two handles. Held in the top of the case is the input hose assembly. A 20' (6 m) output hose is also included.

Of course, alterations to the output hose length may be necessary to accommodate the distance between the motor/pump depth and the PCM and recovery tank location. Consult with Geotech on unit specifications.

There is portal access on each side of the optional case. Looking down on the system, the PCM appears as in Figure 1-1, the portal on the right permits access of the input hose and the cables from the Product and Tankfull probes. The left portal is for the output hose and power cord.

Pump Control Module (PCM)

The PCM is designed for rugged use either with the probe or as a portable transfer pump and is explosion proof (EP) and Intrinsically Safe (IS) for Class 1, Division 1, Group D hazardous locations. The PCM contains several sub-assemblies which are described as follows.

Explosion Proof (EP) Control Switch Box

The EP control switch box houses the ON/OFF switch, the HAND-OFF-AUTO control switch, and an alarm indicator. The box also contains the receptacle connection for the probe and Tankfull cables, various control relays and the fuse blocks.

Pump/Motor

The motor (1/4HP, 1725 rpm) is explosion proof and has thermal overload protection. A self priming gear pump is attached to the motor with a three part, flexible coupling. This motor is used in both the 115V and 230V models and is factory wired for the correct voltage and rotation.

Pump

The pump is a Viking 4 gpm (17 lpm) hydraulic pump with carbon bearings and Viton seals. The pump is mated to the motor with a spider coupling. 1/4-20 socket set screws make the shaft to shaft connection. Some non-detergent oil should be squirted into the pump occasionally, especially if it has been pumping gasoline or solvents or if it is going into storage. Water left in the pump will cause damage.

Alarm Indicator

This red indicator signals either a Tankfull condition or the presence of water within the well. During a Tankfull condition, the indicator will remain illuminated with the control switch in the OFF position. During a water alarm condition, the indicator will go out when the control switch is turned to OFF.

Weatherproof Connectors

These ports contain Intrinsically Safe wiring and provide receptacles for the Tankfull and probe control connectors.

3-Channel IS Relay

The EP box contains a 3-channel, IS relay to which the product probe and Tankfull probe are directly connected. In addition, the EP box also contains other control relays, the fuse blocks, and a potentiometer relay (for timing).

Tankfull Probe

The Tankfull probe (Figure 1-3) is a float actuated fluid level sensor that fits into the collection tank and shuts off the pump when the tank is full. It also acts as a safety device in that it needs to be connected for the SWPS to function. Consult Geotech for other options when a Tankfull probe is not required for your recovery needs.

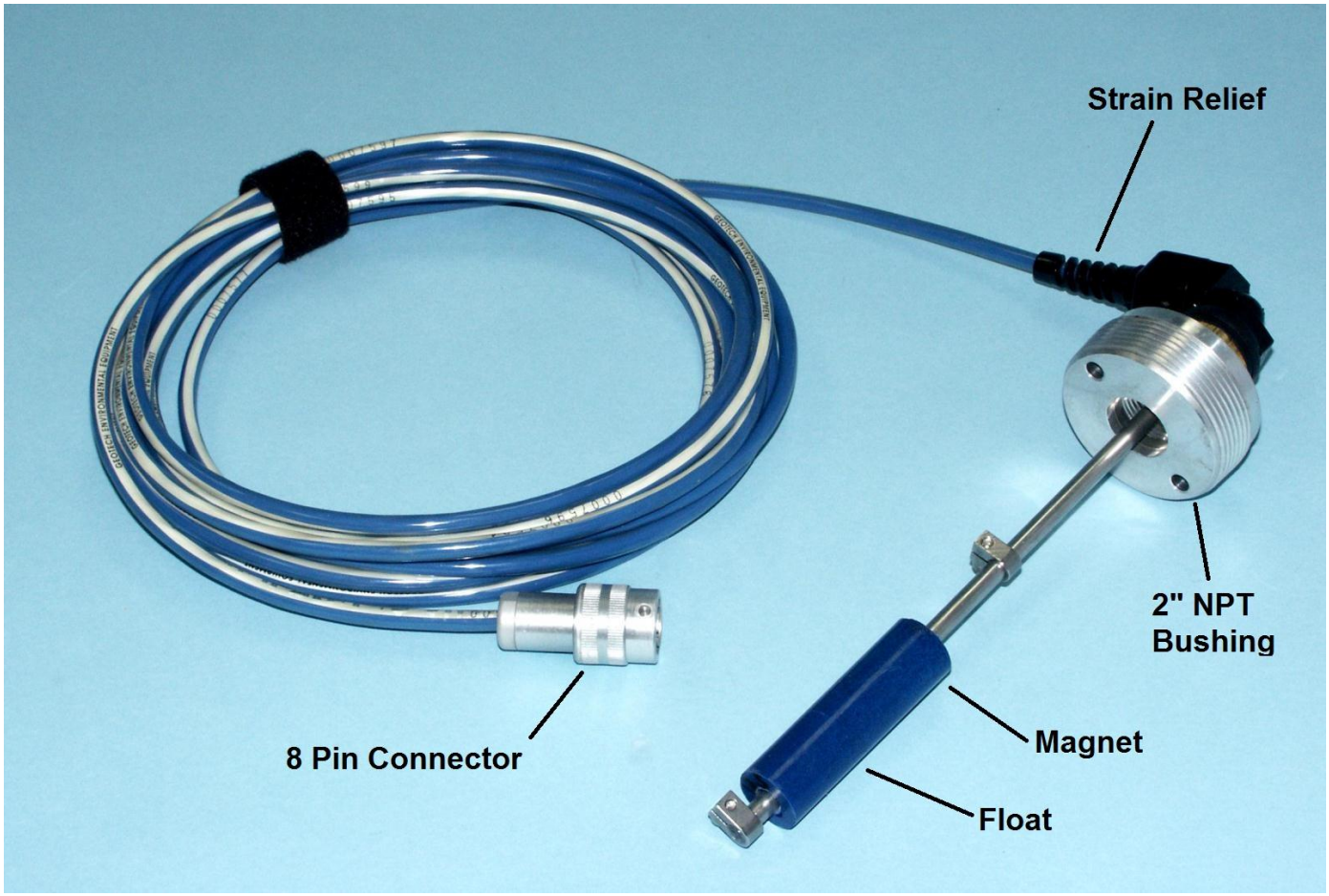


Figure 1-3 – Tankfull Probe.

Intake Assembly and Product Probe

The product intake assembly (Figure 1-4), combined with the product probe, is placed at a specific height within the well. It is designed to recover the product layer from the water surface. A product float within the probe rises and magnetically activates a switch in the PCM, turning on the pump as needed. The pump will continue to run until the product float lowers and shuts off the system. A water float within the probe will also shut off the PCM so that water is not pumped into the recovery tank.

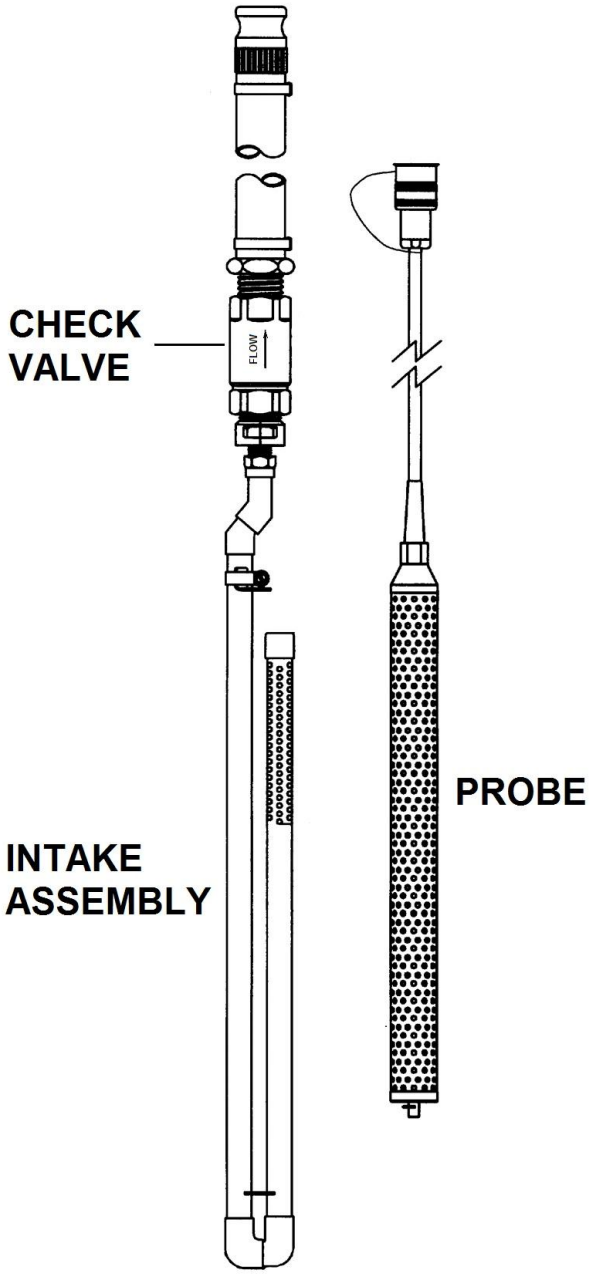


Figure 1-4 – SWPS Intake Assembly with Product Probe

Section 2: System Installation

SWPS Control System

Since both the input hose and the probe cable must be connected to the PCM, place the optional case bottom with PCM, or just the PCM, as close to the recovery point as possible. Ideally, the PCM should be placed within 20’ (6 m) of the intake assembly (the length of the input hose/probe cable), and within 20’ (6 m) of the product recovery tank (the length of the output hose unless additional lengths are ordered). Confirm that the product recovery tank is grounded and is connected to the grounding clip on the output hose.

The two input connections to the PCM (hose and cable) can be made through the right portal of the optional weatherproof case. Remove the black portal cover by twisting it counterclockwise. The cover is tied to the dust plug at the pump input. Remove the dust plug by opening the two handles on the input coupler. Store the portal cover and dust plug within the back of the case (if no case, then place the plug within the spare parts bag).

Run the input hose and control wire through the right portal. Connect the input hose to the input coupler. This is easily done by closing first one, then the other handle on the coupler. Next, locate the 3-pin product probe cable receptacle. Carefully connect the probe cable to the receptacle on the EP box. The connector and receptacle are slotted. Line up the slots, push on the connector and tighten it clockwise.

Now remove the left portal cover by twisting it counterclockwise. The cover is tied to the dust cap at the pump output. Remove the dust cap by opening the two handles on the cap. Store the portal cover and dust cap within the back of the case (if no case, then place the cap within the spare parts bag).

Connect the output hose to the output adapter, running it through the left portal. As with the input hose, this is easily done by closing first one, then the other handle on the output coupler. Run the free end of the output hose to the recovery container and connect its coupler securely to the tank. Confirm that the spring clip at the end of the hose is grounded.

Now connect the Tankfull probe. The Tankfull probe comes with a brass 3/4” NPT fitting that is attached to a 2” NPT aluminum reducer fitting for use with a standard 55 gallon (208 liter) drum or larger tank. Remove the 2” NPT reducer fitting for use in a 3/4” NPT bung hole. Adapters are available for other fittings. The Tankfull float will rise when the product level is approximately 4” (102 mm) from the top of the recovery tank. The standard Tankfull assembly comes with a 25’ (7.5m) cable, but alternate lengths can be provided by Geotech.

Once the Tankfull probe is fitted onto the recovery tank, run its cable next to the input hose into the right portal on the PCM. Locate the 8-pin Tankfull control cable receptacle. Carefully connect the control cable to the receptacle on the EP box. The connector and receptacle are slotted. Line up the slots, push on the connector and tighten it clockwise. The Tankfull and buoy cable connectors are not interchangeable.

The Tankfull cable must be connected for the system to operate. This also acts as a safety function in case the cable is severed.

When the Tankfull float rises to the top of its travel, the pump will automatically turn off and the red indicator on top of the control switch box will be illuminated. The red alarm indicator will also be illuminated if the Tankfull connector becomes disconnected or if the cable is accidentally cut.

Place the Intake Assembly and Product Probe in the well

Use a Geotech Interface Probe to determine the product layer thickness, depth, and recharge rate. Use this measurement to properly place the intake (with probe attached) into the well or collection point. Prior to installing the intake assembly, determine if any adjustments are needed to the PCM's potentiometer to match the recharge rate of the well. See Float Time Delay later in this section.

Water Table Depression Pump (WTDP)

If the water table continues to fluctuate as such that water float rises and turns off the PCM often, then it may be necessary to install a WTDP pump with probe to keep the water table level. Contact Geotech to discuss alternatives to well recovery with a fluctuating water table.

PCM Controls

The SWPS controls consist of the electronics in the control module (Figure 2-1), the product pump and motor, the product probe and the Tankfull probe (see also Figure 7-1 for an example of a standard system configuration.)

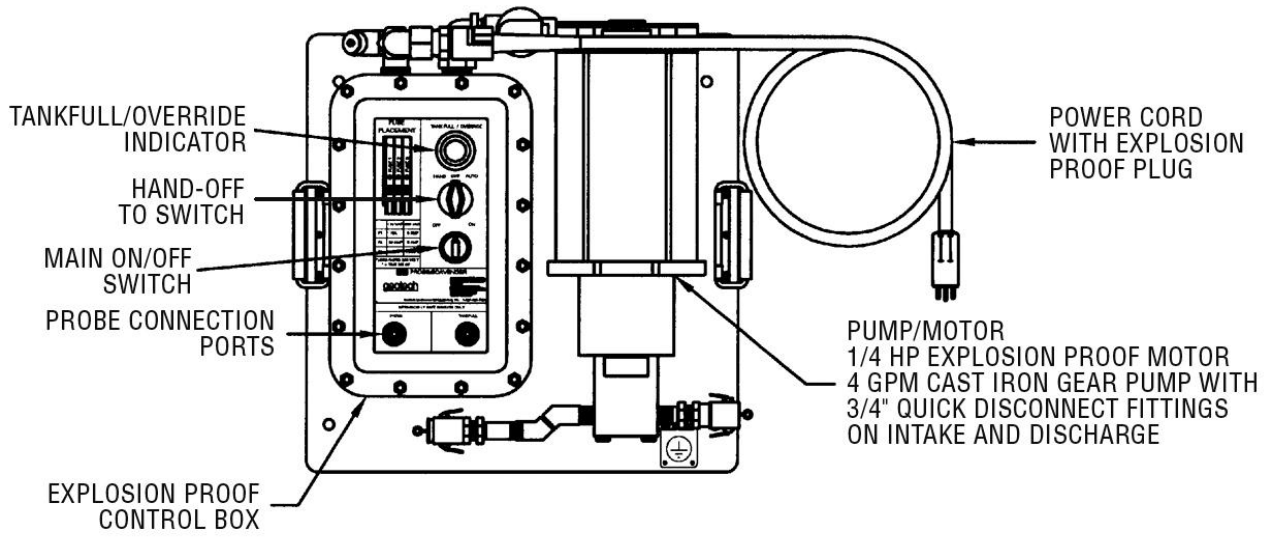


Figure 2-1 – SWPS Control Module with Pump and Motor

The control system provides the user with many options for optimal recovery. It is rated explosion proof for class I, division I, Group D hazardous locations and meets with intrinsic safety standards.

The controls on the control box are described as follows:

Control Switch: 3 position HAND-OFF-AUTO

HAND - Pump is on regardless of probe sensing conditions. The Tankfull will override.

OFF - Pump is off regardless of sensing conditions.

AUTO - Pump is on only when the hydrocarbon float is up and the water float and Tankfull float is down.

Red Indicator:

When illuminated it either indicates that the recovery tank is full or the intake is in the water. This signal is received from the Tankfull probe. When the float on the Tankfull rises, the pump will not operate and thus avoids overfilling the recovery tank.

Float Time Delay Potentiometer:

(Inside PCM EP box): Sets the time delay to turn on pump when product float rises. Timer can be set from .1 to 10 minutes. A LOW–TIME delay setting is appropriate for situations in which product builds up rapidly, while the HI-TIME DELAY setting is for pumping slower accumulating product layers.

Tankfull Receptacle:

8-pin receptacle on top of control box for the Tankfull probe.

Tankfull Probe:

The Tankfull probe (shown in Figure 1-3) is designed to be mounted on a product recovery tank (not supplied by Geotech). It has both a ¾" NPT bushing and a 2" NPT bushing for use with 55 gallon (208 liter) drums or larger tanks. A groove has been cut into the bushings for venting purposes. The Tankfull probe is wired in such a way that a broken wire will disable the control module and pump. When the recovery tank is full, the float on the Tankfull probe rises and sends an override signal to the control module. This prevents the pump from running and steadily illuminates the red LED on the control box.

Product Probe Receptacle:

3 pin receptacle on top of control box for sensing the following elements of the probe.

Product Float:

An HDPE float with an internal magnet and blue coloring. The product float activates the AUTO reed switch to run the pump. The AUTO reed switch is 2" (5 cm) above the water float on the probe. The float will rise in either product or water.

Water HI float:

An HDPE float with an internal magnet and orange coloring. This is a density float that rises in water. When activated a signal is sent to the control module which prevents the product pump from running.

Section 3: System Operation

This system is designed to be explosion proof (EP). Disconnect power before opening any enclosure.

Before the SWPS is deployed it should be set up and tested. It is best to first familiarize yourself with the controls as detailed in Section 2.

1. Set the PCM near the well.

2. Insert the PCM power plug into an appropriate single phase power source. (If your unit operates on 115VAC, connect to an 115V source; if your unit operates on 230VAC, connect to a 230V source).

3. Refer to Section 2 and go through, HAND, OFF and AUTO selections. A bucket of water 12” (30 cm) deep can be used for testing purposes.

Do not run the pump dry for more than 5 seconds as this will damage the gears beyond repair.

4. To check the pump, briefly turn the control switch to HAND. The pump should start. Turn the switch to OFF.

5. Temporarily remove the outer screen on the probe. Turn the selector switch to AUTO and turn the product probe upside down in the air. Holding the probe this way simulates a situation in which the product float has risen and the probe is in product only. The pump should start.

6. Now, lift the float on the Tankfull probe to simulate a full recovery tank. The pump should stop and the red indicator should be steadily illuminated.

7. Drop the Tankfull float and turn the product probe right side up in the air. The pump will not start because the product float will be down. Start the pump by lifting the product float and dip the probe in water until the water float is submerged and rises, which should stop the pump.

The SWPS System can be deployed in two different configurations:

A. With no water pump.

B. With an independent water pump, also known as a WTDP pump.

Option A: With no water pump:

This situation will produce very slow recovery rates unless there is considerable product layer. The best location for the probe is slightly below the middle of the product layer.

To deploy and start the system, simply lower the intake/probe assembly into the well, confirm that the output hose is secured at the recovery tank and turn the control switch to AUTO. Assuming that sufficient product is present in the well, the SWPS will begin pumping.

Option B: With independent water pump:

In this option, the water pump is used to depress the water table and thereby concentrate product in the well. Since the water and product pumps are operating independently, any change in the level of the water table will require adjustment of the pump intakes in the well.

The water alarm indicator is useful in determining when adjustment of the intake is necessary. When the intake assembly is set too deep, the red light will illuminate indicating that the water float is under water. If set too shallow, there will be no signal.

When using a water pump with the SWPS, the water pump must be deployed first. Follow the instructions found in the Water Table Depression Pump User Manual (included with WTDP assemblies). After the water pump has been deployed and a pumping level established, deploy the SWPS as described in Option A.

Section 4: System Maintenance

The SWPS pump/motor and control electronics are factory sealed and require no maintenance. The only regular maintenance required is periodic cleaning of the system probes. Every week, or more often as necessary, rinse both probes in clean fuel and/or hot water. This procedure will prevent fouling of the probes and sticking of the floats. Also while the intake is out of the well, check to ensure no accumulation of debris has occurred on the intake strainer and verify there are no obstructive kinks or holes in the intake and output hoses.

Section 5: System Troubleshooting

Disconnect power before opening any enclosure. Carry out troubleshooting procedures in a non-hazardous (non-flammable) location.

In this section possible malfunctions are listed along with suggested procedures for determining their causes. In many cases, these troubleshooting procedures can be simplified by using the three LED's on the 3-channel relay as diagnostic indicators of system status.

The LED's, located on the 3-channel relay inside the control panels EP box (see Section 7, System Schematic), indicate the positions of the oil and water floats inside the probe, as well as the Tankfull float in the recovery tank. An illuminated LED indicates a closed switch. The following table summarizes the conditions which cause each of the LED's to be either ON or OFF.

LED	ON	OFF
A	1. Water float in probe is up. 2. Short between "A" & "C" on probe, probe connector, or in wiring. 3. Defective relay.	1. Water float in probe is down. 2. No connection between "A" & "C" on probe, probe connector, or in wiring. 3. Defective relay.
B	1. Oil float in probe is up. 2. Short between "A" & "B" on probe, probe connector, or in wiring. 3. Defective relay.	1. Oil float in probe is down. 2. No connection between "A" & "B" on probe, probe connector, or in wiring. 3. Defective relay.
C	1. Tankfull float is down. 2. Short between "A" & "B" on Tankfull, Tankfull connector, or in wiring. 3. Defective relay.	1. Tankfull float is up. 2. No connection between "A" & "B" on Tankfull, Tankfull connector, or in wiring. 3. Defective relay.

Table 1 – SWPS system status as indicated by LED's on 3-channel relay

Problem: Motor does not run on HAND or AUTO.

Solution:

1. Check power source.

2. Check recovery tank. If recovery tank is not yet full then check for defective alarm indicator bulb on control panel box (a faulty light will stop control panel operation).

3. Check Tankfull probe. Disconnect Tankfull cable connector from connector box and jumper sockets A & B in the receptacle. If motor runs, the problem is in the Tankfull probe itself. Confirm that the Tankfull float is free on its shaft. When the Tankfull probe is disconnected, the red indicator light will come on. See Tankfull diagnostic later in this section.

4. Move system to a nonhazardous location. Open the EP box, plug in the control panel and turn the power switch to the ON position. Jumper sockets A & B in the Tankfull receptacle. The red LED (marked "C") on the top of the 3-channel relay should be illuminated. If the LED is not illuminated, disconnect power and check the continuity between #4 & #5 on the relay. If this continuity check reveals an open circuit, call Geotech (1-800-833-7958) for assistance.

5. If no open circuit is found and the motor still does not run, disconnect power, open the EP box and check the fuses. 115VAC systems will have one 20 AMP fuse and one 1 AMP fuse. All 230VAC systems have two 8 AMP fuses and one 1 AMP fuse. Replace fuses if necessary and reseal the box.

When resealing any explosion proof box, clean the cover flange and coat it with LUB-G flame joint grease.

6. If the fuses are good, transport the system to a nonhazardous location and use the following procedure to test the DPDT relay. Referring to Figure 7-2, Wiring Diagram, run a jumper from the Normally Open contact to the Common on the DPDT relay. Be careful not to short the switch contacts to the EP box. Apply power to the system. If the motor runs with the control switch in the HAND position the mechanical relay must be replaced.

7. If the motor does not run, disconnect power and remove the jumper attached in Step 6. Now with the control switch in the HAND position, check the resistance between the Normally Open contact on the relay and pin 4 on the solid state relay (SSR).

   If the meter indicates a short circuit, replace the SSR relay. If the meter indicates an open circuit, check for loose or broken wires. If none are found, call Geotech (1-800-833-7958) for assistance.

Problem: Motor runs on HAND but not on AUTO.

Solution:

Most problems on the AUTO setting can be traced to float malfunctions. Examine the product float and confirm that it is not heavy and that it can freely move up and down throughout its normal travel. Also check to see that the water float is not stuck in the up position and that there are no obstructions between the float and its seat. If the probe was cleaned, verify that neither float has been re-installed upside down.

If a float malfunction is not the problem, examine the control cable for cuts and breaks, then use an ohmmeter to test the probe control circuit (refer to Section 8, System Schematic). In the probe cable receptacle are three pins labeled A, B, and C. With the meter on the R x 1 scale, these receptacles should read electrically as follows:

A-C Open when water float is down.

A-C Closed when water float is up.

A-B Open when the oil float is down.

A-B Closed when the oil float is up.

A-B Open when both oil and water floats are up.

Problem: Motor runs continuously on AUTO.

Solution:

1. Disconnect the probe to determine if the oil float is stuck in the up position.

2. If the motor continues to run, the problem is not in the probe. Disconnect the Tankfull and check for a fault in the Tankfull probe as described later in this section.

3. If neither the oil float nor the Tankfull is found to be faulty, check for a solid state relay (SSR) failure. Unplug the control panel from its power source, move to a nonhazardous area and open the EP box. Lift off the EP box cover and lay it to the side of the box. Remove the 1 AMP fuse and apply power to the system. If the pump runs, the SSR is faulty and must be replaced.

4. If the SSR is not faulty, replace the fuse and check the resistance across the HAND-OFF-AUTO switch (refer to Section 7, System Schematic). Move the switch from HAND to OFF. The meter should show a change from a closed circuit to an open circuit. If the switch cannot be made to operate properly, call Geotech (1-800-833-7958) for assistance.

5. If the control switch is not at fault, check the function of the 3-channel relay. Check the resistance between pins 11 and 12 on the relay. If the meter indicates a closed circuit, check for shorted wires. If none are found, call Geotech (1-800-833-7958) for assistance.

Problem: System runs normally but alarm indicator remains on.

Solution:

Disconnect power, move the system to a nonhazardous location and open the EP box. Check the resistance between pins 9 and 10 on the 3-channel relay. If the meter indicates a closed circuit, check for shorted wires. If no shorts are found, the relay must be replaced. Call Geotech (1-800-833-7958) for assistance.

Problem: Pump/motor taking too long to come on.

Solution:

Unplug the control panel from its power source, move to a nonhazardous area and open the EP box. Verify that the potentiometer is set all the way to 0.1. A very long delay may mean a damaged potentiometer. Call Geotech (1-800-833-7958) for assistance.

Problem: Pump runs but loses prime

1. Check for a stuck or cracked check valve. Replace if necessary

2. Check for damaged hoses. Replace if necessary.

Problem: Tankfull Probe or Alarm Indicator Light not operational.

Solution:

The control panel will not operate if there is a cut in the Tankfull probe cable or when the alarm indicator light is burned out. These are built in as safety features. Whenever the Tankfull probe is disconnected, the red indicator light will come on when applying power to the control panel. All alarm light issues must be resolved prior to using the system.

If the light does not come on after removing the Tankfull probe, then replace the bulb. If this doesn't work, then there may be a fault in the internal circuitry.

To check for a faulty Tankfull probe, do the following:

1. Disconnect the Tankfull cable connector from the control panel and jumper sockets A & B in the control panel receptacle. If the motor runs in HAND then the problem is in the Tankfull probe itself.

2. Confirm that the Tankfull float moves freely on the shaft. If the probe was cleaned, verify the float was not put back on upside down.

3. Check for proper function of the probe. Using an ohm meter on the R x 1 scale, the following pins should read electrically as follows:

   A-B Closed when Tankfull float is down.

   A-B Open when Tankfull float is up.

   E From pin E to any metal part of the probe there should be continuity.

   Any deviation from this test means the probe is faulty. Contact Geotech (1-800-833-7958) for assistance.

Additional problems can occur if the intake is not checked for blockage and the probes are not regularly cleaned.

Section 6: System Specifications

New SWPS Specification Sheet

System Type:

- ☐ Standard Deep Well
- ☐ Small Diameter Deep Well
- ☐ Surface Mounted Shallow Well
- ☐ Chlorinated
- ☐ Viscous Oil

Pump Power Requirements:

____ Voltage

____ Phase

____ Amps

____ Hz

Tankfull:

- ☐ Standard
- ☐ Aromatic

Cable / Hose Lengths:

_____ft./m Power Cord

_____ft./m Input Hose

_____ft./m Output Hose

Lengths & Dimensions:

Fits in _____ inch/cm diameter wells

_____ft./m Sensor Cable

_____ft./m Tank full Cable

Serial No _____

P.I.D. No. _____

Inspected by: _____

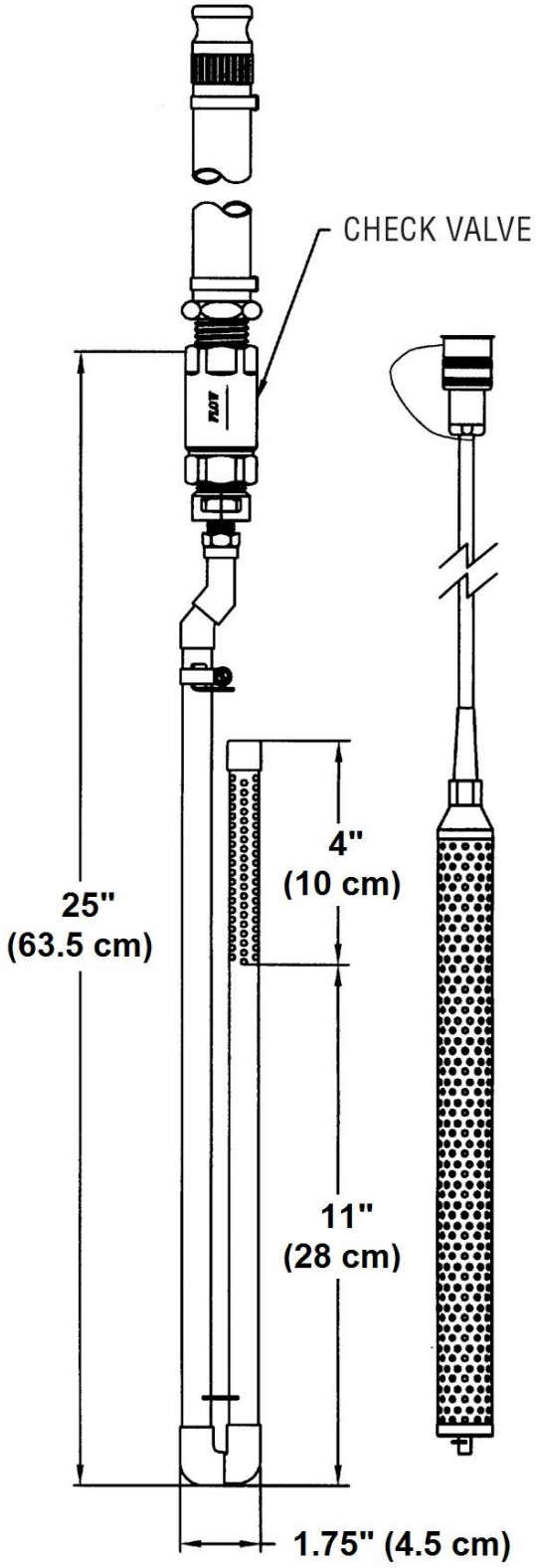


Figure 6-1 – Intake Specifications

Section 7: System Schematic

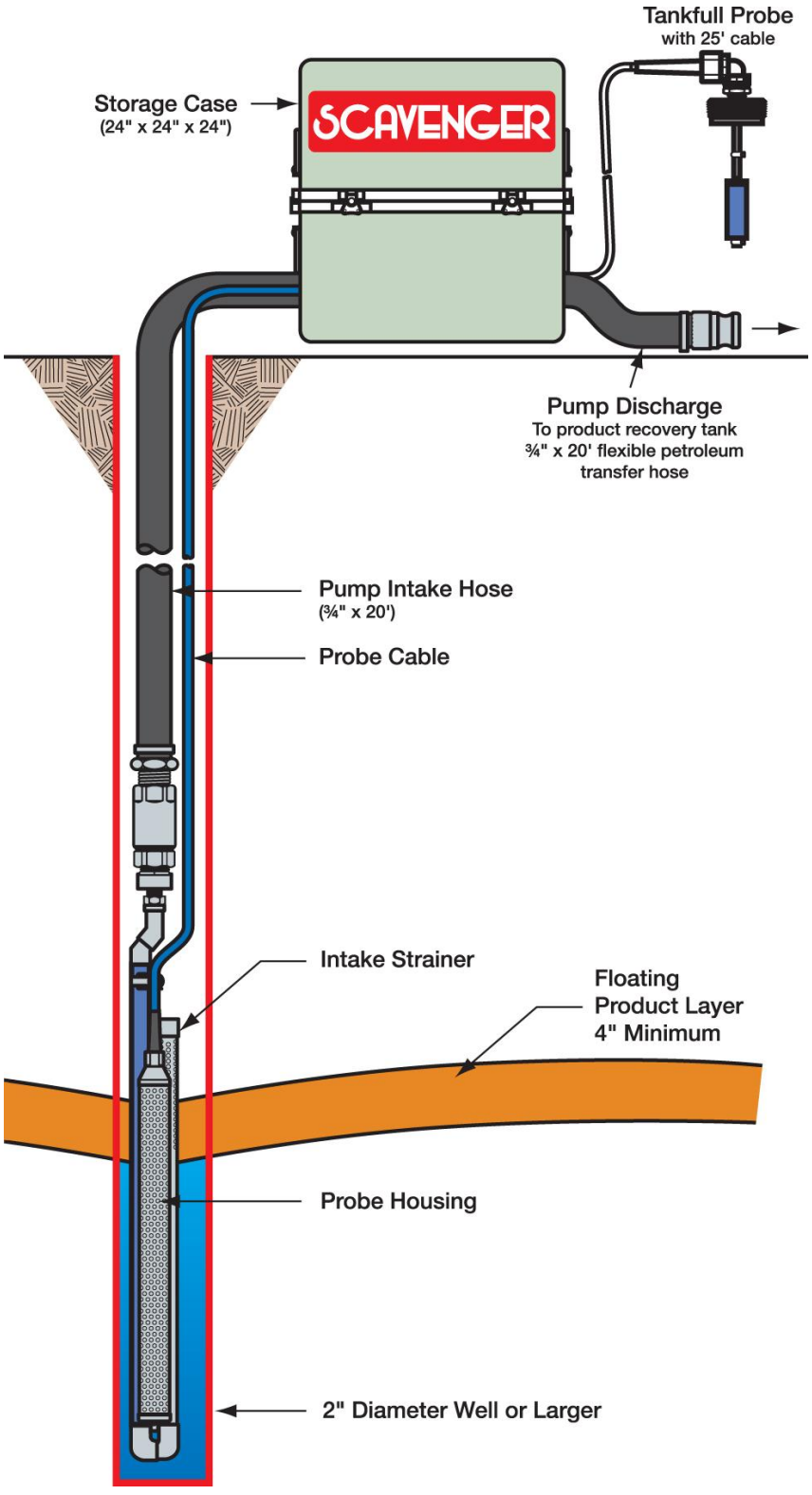


Figure 7-1 – Standard System Assembly

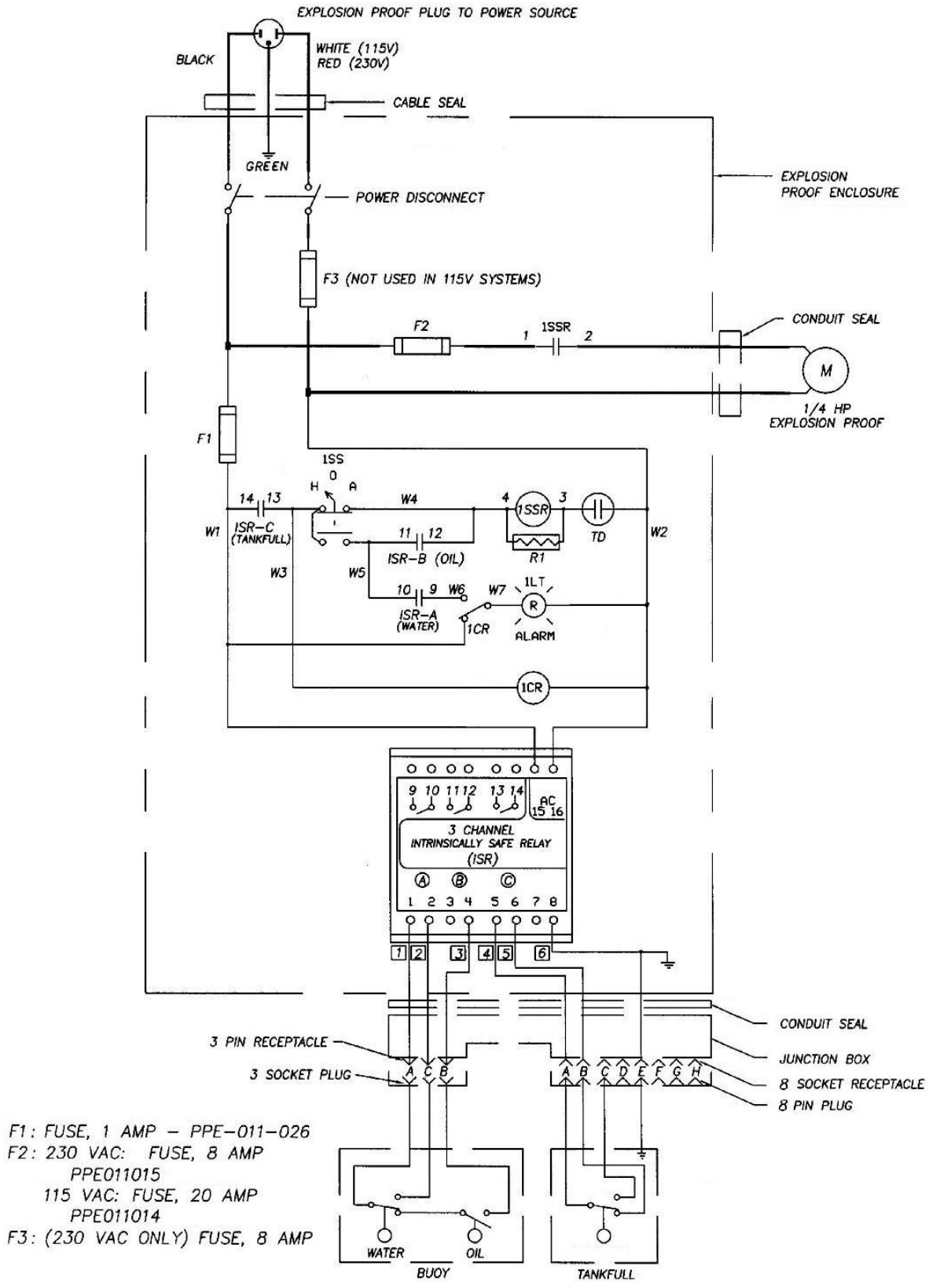


Figure 7-2 – Wiring diagram for the SWPS Control Module

Section 8: Replacement Parts List

Parts Description	Parts List
Pump Control Module	
CASE,FILT SCAV,COMPLETE	ORS026004
DRAIN SCREEN,SS,1.5 OD	ORS026005
FOOT,ELASTOMER,2.50"OD	PPF028001
BARRIER,PORTAL,5-3/4"DIA	ORS036002
PORTAL,RETAINER & COVER	PPM026002
RELAY,I.S.,120V,3 CHAN	PPE014067
RELAY,I.S.,240V,3 CHAN	PPE014062
RELAY,110V,DPDT,10 AMP	PPE014090
RELAY,230V,10AMP,DPDT,RCT	PPE014091
RELAY,90-280VAC,25AMP MAX	PPE014092
LIGHT,IND,RED,120V	PPE102002
LIGHT,IND,RED,230V	16020012
RELAY,120V,TIMER,LDFS	16020006
RELAY,230V,TIMER,LDFS	16020007
POTENTIOMETER,5MA,LDFS	16020008
PUMP,4GPM,GRAPHITE/VITON	PPP005017
MOTOR,1/4HP,115/230V,1PH	PPE018004
COUPLING,MOTOR,1/2"X1/2"	56020002
POWER CORD ASSY,115V,3/4"	2011036-25
POWER CORD ASSY,230V,3/4",25FT	2012006
PLUG,115V,EP	PPE017001
PLUG,230V,EP	PPE017003
CONTROL RECEPTACLE,3 PIN ASSY, POTTED, 2005	26020023
CONTROL RECEPTACLE,8 SOCKET, ASSY,POTTED, 2005	26020024
Tankfull	
TANKFULL ASSEMBLY	2010014
TANKFULL ASSY,AROMATIC,FM	2010080
TANKFULL FLOAT ASSEMBLY	2010023
REDUCER,AL,2 TO .75,VENTED	ORS535001
CONNECTOR,8 PIN,FEMALE PANEL	16120002
Output Hose	
HOSE,.75"x20',W/FTGS & GROUNDING CLIP	ORS037001
HOSE,.75"x20',W/FTGS	ORS037002

Intake

INTAKE ASSY,2",SH WELL SYS	2020007
STR,INTAKE:3/4 NPT X 21 L	ORS330004
BRACKET,PROBE MTG,TOP	ORS698005
BRACKET,PROBE MTG,BOTTOM	ORS698006
CLAMP,HOSE,1-1/4x1/2x1	PPF029005
CLAMP,WORM DR,SST,.31-.88	PPF057012
HOSE,GAS,.75"DIA,150 PSI 3/4" PREMOFLEX	PPP001023
HOSEBARB,BRS,3/4X3/4MPT	PPP002025
CHECK VALVE,SST,3/4",BALL	PPP006039
QDISC,BRS,.75"Mx.75"BARB	PPP007003
BUSHING,SS6,.75"x.5"	PPP012049
BUSHING,PVC80,1.25"x.75"	PPP012050

Product Probe

PROBE,SHALLOW WELL PROB SCAV,2005	56030008
PROBE BOT,HAIRPIN STYLE	00221
HAIRPIN,SS,.25X.042	00229
COLLAR,SHAFT,.25"DIA	2010037
PRODUCT FLOAT ASSY,SM DIA	2020102
PROBE CSG,1.06IDx12,CTD	ORS231004
ASSY,WATER FLOAT,SM DIA	2020101
CONNECTOR,3 SCKT,FEMALE CABLE	16120001

Spare Parts

SPARE PARTS BAG,115V,LDFS	2010002
SPARE PARTS BAG,230V,LDFS	56020001
SPARE PARTS BAG,230V,LDFS,FM	2012068
SPACER,.75x.35	ORS362001
FUSE,20A,250V,NON DLY,ABC	PPE011014
FUSE,8A,250V,NON-DELAY	PPE011015
FUSE,1A,250V,SLO-BLO	PPE011026
WASHER,VITON,FOR KAMLOC	PPP013002
NUT,HEX,NYL,5/16-18	ORS761001

ASSY,WINCH,STD DUTY,71FT 1000LB MAX	2020005
ASSY,WINCH,HEAVY DUTY,110FT 2500LB MAX	2030001

MANUAL,SHALLOW WELL PROBE SCAV	16030005

Appendix A: Recoverable Materials

In order for a material to be recovered by the Geotech LDFS, it must have the following properties:

- It must float on water.
- Its specific gravity must be less than 1.0 and its kinematic viscosity less than 100SSU, for use with the "light" oil filter cartridge, and between 100 and 400SSU for use with the "heavy" oil filter cartridge.

This means that short chained alcohols, carbon disulfide, chloroform, carbon tetrachloride and other dense solvents which are heavier than water can only be recovered by using a Geotech Probe Scavenger. Solvents that are lighter than water can be recovered with the filter cartridges that come with the LDFS. See Section 7 and Appendix C for more information.

The following will work with the average LDFS filters:

Alkanes: e.g. pentanes, hexanes, heptanes, etc.
Alkenes: e.g. 2-pentane, 3, 4-dimethyl-2-hexane, etc.
Aromatic hydrcarbons: e.g. benzene, toluene, xylene, vinyl benzene, etc.
Alcohols with 4 or more carbon atoms: e.g., nbutyalcohol, hexanol, octanol, etc.
Esters with 5 or more carbon atoms: e.g. pentyl acetate.

Mixtures of the above: fuel oils, gasoline, kerosene, mineral spirits, naphthas, etc.
Mono-alkyl halides: e.g. ethylchloride, allyl chloride, etc.

The Aromatic LDFS must be used to recover materials containing aromatic hydrocarbons. It has epoxy/EFP filter cartridge, FEP input hoses, modified floats, etc.

Materials requiring an Aromatic LDFS are marked with an asterisk (*) on the following list.

If the water in which the LDFS buoy is floating is very acidic or basic, a pH LDFS and buoy may be necessary. This LDFS employs all the features of the aromatic unit, as well as resistance to extreme pH conditions. This unit should generally be used when pH is lower than 5 or greater than 9 (requires specific information on the water and materials to be recovered prior to final specification of components for the pH LDFS).

The following list is taken from a composite of materials deemed hazardous by:

1. Environmental Protection Agency, Hazardous Substances, Federal Register, December 30, 1975

2. Environmental Protection Agency, Contingency Plan, Region II for spills of Oil and Other Hazardous Materials for Inland Waters of Region II.

3. National Fire Protection Association, Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids, NFPA #325M-1969.

Many other non-hazardous substances, not on this list, can also be recovered. Examples of this are the variety of Edible Vegetable Oils. When in doubt, materials should be tested using a Demo Kit. See Appendix C for more information.

All materials listed here will work with the LDFS System.

allyl chloride
amyl acetate
amyl alcohol
sec-amyl alcohol
amyl benzene*
amyl chloride (1-chloropentane)
tert-amyl chloride
beta-amylene-cis
beta-amylene-trans
amyl ether
amyl formate
amyl maleate
amyl propionate (pentyl propionate)
amyl toluene*
benzene*
benzyl formate*
bicyclohexyl (dicyclohexy)
butyl acetate
sec-butyl acetate
butylbenzene*
sec-butylbenzene*
tert-butylbenzene*
butylchloride (1-chlorobutane)
sec-butylchloride (2-chlorbutane)
ter-butylchloride (2-chloro-2-methylpropane)
butyl butylrate
tert-butyl carbinol (2,2-dimethyl-1-propanol)
butylisovalerate
butylmethacrylate
2-chlorobutene-2
chloroethane
1-chlorohexane
cumene (2-phenyl propane, osproply, benzene)*
cycloheptane
cyclohexane
cyclohexene
cyclohexyl acetate
cyclohexyl benzene*
cyclohexyl chloride
cyclopentane
cyclopentanol
decane
decanol
1-decene
decylbenzene*
diamylene
Diesel Fuel #1
Diesel Fuel #2
O-diethyl benzene*
m-diethyl benzene*
p-diethyl benzene*
diethylcyclohexane
3,3-diethylpentane
diisopropyl benzene*
2,2-dimethylbutane
2,3-dimethylbutane
2,3-dimethyl-1-butene
2,3-dimethyl-2-butene
1,4-dimethylcyclohexane
1,4-dimethylcyclohexane-cis
1,4-dimethylcyclohexane-trans
2,4-dimethyl-3-ethylpentane (3-ethyl-2,4-dimethylpentane)
3,3-dimethylheptane
2,3-dimethylhexane
2,4-dimethylhexane
2,3-dimethyloctane
3,4-dimethyloctane
2,3-dimethylpentane
2,4-dimethylpentane
dipentene
1,1-diphenylbutane*
1,1-diphenylpentane*
1,1-diphenylpropane*
dodecene
1-dodecanol (lauryl alcohol)
dodecylene (1-dodecene)
ethyl acetate
ethylbenzene*
2-ethyl-1-butene
2-ethylbutyl acetate
2-ethylbutyl acetate
2-ethylbutyl alcohol
ethylcyclopentane
ethyl formate
2-ethylhexyl chloride
ethyl isobutyrate
3-ethyloctane
4-ethyloctane
ethyl methacrylate
ethyl propionate
m-ethyltoluene (1-methyl-3-ethylbenzene)*
o-ethyltoluene (1-methyl-2-ethyltoluene)*
p-ethyltoluene (1-methyl-4-ethyltoluene)*
Fuel Oil #1(kerosene, range oil,coal,oil)
Fuel Oil #2
Gasoline
hendecane
heptane (all isomers)
2-heptanol
3-heptanol
heptylene (1-heptene)
heptylene-2-trans (2-heptene-trans)
1,4-hexadiene
hexane
1-hexene
2-hexene
hexyl acetate
hexyl alcohol
sec-hexyl alcohol (2-hexanol)
isoamyl-alcohol
isoamyl chloride (1-chloro-3-ethylbutane)
isoamyl butyrate (isopentyl butyrate)
isobutane
isobutyl benzene*
isobutyl chloride
isodecane
isoheptane
isophorone
isoprene
isopropyl bicyclohexyl
Jet Fuels
Kerosene
methallyl chloride
methyl methacrylate
2-methyl-1-butanol
2-methyl-2-butanol
2-methyl-1-butene
2-methyl-2-butene
3-methyl-1-butene
methcyclohhexane
2-methylcyclohexanol
3-methylcyclohexanol
4-methylcyclohexanol
methylcyclohexanone
methylcyclopentadiene
methylcyclopentane
2-methyldecane
1-methyl-3,5-diethybenzene*
2-methyl-4-ethylhexane
3-methyl-4-ethylhexane
2-methyl-3-ethylpentane
2-methyl-1,3-pentadiene
2-methyl-1,3-butadiene (isoprene)
2-methylpentane
3-methylpentane
2-methyl-1-pentanol
4-methyl-2-pentanol acetate
2-methyl-1-pentene
4-methyl-1-pentene
2-methyl-2-pentene
methyl propionate
methylstyrene*
mineral oil (less than 45cs)
mineral spirits
naphtha
nonane
nonane (iso), 2-methylloctane, 3-methyloctane, 4-methyloctane
nonylbenzene*
octane
2-octanol
1-octene
octyl formate
octyl alcohol (1-octanol)
octyl chloride
pentachlorophenol*
pentane
3-pentanol
petroleum, light crude
Petroleum ether (benzene,naphtha)
Pinane
Propylbenzene (phenylpropane)*
propyl chloride
propyl propionate
Stoddard solvents
styrene (cinnamene, phenylethylene vinyl benzene)*
2,2,3,3-tetramethylpentane
2,2,3,4-tetramethylpentane
Toluene*
Toluol*
1,2,3-trimethylbenzene*
1,2,4-trimethylbenzene (pseudocumene)*
1,3,5-trimethylbenzene (mesitylene)*
2,2,3-trimethylbutane
2,3,3-trimethyl-1-butene
2,5,5-trimethylheptane
2,2,5-trimethylhexane
2,6,8-trimethylnonane
2,3,4-trimethyl-1-pentane
2,4,4-trimethyl-1-pentene
2,4,4-trimethyl-2-pentene
3,4,4-trimethyl-2-pentene
Turpentine
4-vinyl cyclohezene
vinyl propionate
m-xylene*
o-xylene*
p-xylene*
xylol

Appendix B: Decontamination Procedures

Some common decontamination solutions are listed below along with the contaminants they are effective against:

Solution	Effective Against
Water	Short-chain hydrocarbons, inorganic compounds, salts, some organic acids, other polar compounds.
Dilute Acids	Basic (caustic or alkaline) compounds, amines, hydrazines.
Dilute Bases	Acidic compounds, phenols thiols, some nitro- and sulfonic compounds.
Organic solvents	Non-polar compounds (such as some organic compounds)

The use of organic solvents is not recommended because:

1) organic solvents can permeate and/or degrade protective clothing and

2) they are generally toxic and may result in unnecessary employee exposure to hazardous chemicals.

When in doubt, use a dish washing liquid detergent. As a decontamination solution, it is readily available, is the safest of all the above, and is usually strong enough if used generously.

The use of steam can also be effective for decontamination. A water-lazer (pressurized water) is exceptionally valuable.

The following substances are noted for their particular efficiency in removing certain contaminants or for decontaminating certain types of equipment.

Solution	Effective Against
Penetone	PCB Contamination (since penetone may also remove paint, it is a good idea to spot-test before use)
Liquinox	Contaminated pumps
Ivory liquid	Oils
Diluted HTH	Cyanides
Radiac	Low level radioactivity
Isopropanol	Biological agents (should not be used on rubber products since it will break down rubber)
Hexane	Certain types of lab or sampling equipment (use of hexane is discouraged due to its flammability and toxicity)
Zep	General purpose cleaning
Alconox	General purpose cleaning

Decontamination Solutions to Avoid

Some decontamination solutions should be avoided because of their toxicity, flammability, or harmful effects to the environment. Halogenated hydrocarbons, such as carbon tetrachloride, should not be used because of their toxicity, possible incompatibility, and some because of their flammability.

Organic decontamination solutions should not be used on personal protective equipment (PPE) because they may degrade the rubber or other materials comprising the PPE.

Mercurials are sometimes used for sterilization. They should be avoided because of their toxicity.

Chemical leaching, polymerization, and halogen stripping should all be avoided because of possible complications during decontamination.

Sand-blasting, a method of physical removal, should be avoided because the sand used on the contaminated object usually needs to be disposed of as hazardous waste, a very costly proposition. Also, sand-blasting exposes personnel to silica, a carcinogen.

Freon is known to be particularly effective for the cleansing of PCB's but its effect on the ozone layer is extremely harmful. Its use is discouraged.

Strong acids or bases should not be used when cleaning metals and gaskets or tools or other equipment because of the possibility of corrosion.

Disposal of Decontamination Solutions and Waste Water

All solutions and water used for decontamination must be collected. If lab analysis indicates that the water and/or solutions exceed allowable contamination levels, they must be treated as hazardous waste. Alternatively, the solutions and water may be treated on-site to lower the contamination levels and render them non hazardous.

Containers such as 55 gallon (208 liter) drums should be available for storage of wastes.

Spent decontamination solutions can be collected by using heavy-duty plastic sheets, visqueen sheets, kiddie pools, or if needed, a larger containment basin. The decontamination of equipment must be performed on the sheets or in the basins. They could be placed on a slight angle so that the spent decontamination solutions drain into a collection basin or drum.

Recommended Supplies for Decontamination of Personnel, Clothing and Equipment

The list below contains recommendations for supplies which would be on hand for the decontamination of personnel, clothing and equipment. Depending on the site activities, not all of these items may be needed. Alternatively, some additional items not listed here may be required.

- Drop cloths of plastic or other suitable material, such as visqueen, for heavily contaminated equipment.
- Disposal collection containers, such as drums or suitably lined trash cans for disposable clothing and heavily contaminated personal protective clothing or equipment to be discarded.
- Lined box with adsorbent for wiping or rinsing off gross contaminants and liquid contaminants.

- Wash tubs of sufficient size to enable workers to place booted foot in and wash off contaminants (without a drain or with a drain connected to a collection tank or appropriate treatment system).
- Rinse tubs of sufficient size to enable workers to place booted foot in and wash off contaminants (without a drain or with a drain connected to a collection tank or appropriate treatment system).
- Wash solutions selected to wash off and reduce the hazards associated with the contaminated wash and rinse solutions.
- Rinse solution (usually water) to remove contaminants and contaminated wash solutions.
- Long-handled, soft-bristled brushes to help wash and rinse off contaminants.
- Lockers and cabinets for storage of decontaminated clothing and equipment.
- Storage containers for contaminated wash and rinse solutions.
- Plastic sheeting, sealed pads with drains, or other appropriate method for containing and collecting contaminated wash and rinse water spilled during decontamination.
- Shower facilities for full body wash or at a minimum, personal wash sinks (with drains connected to a collection tank or appropriate treatment system).
- Soap or wash solution, wash cloths and towels.
- Clean clothing and personal item storage lockers and/or closets.

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The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used.

Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate equipment for a fee, which will be applied to the repair order invoice.

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